

SEQUENCE LISTING

<110> Wang, Chang Yi
Walfield, Alan M.

<120> PEPTIDE COMPOSITION AS IMMUNOGEN FOR THE TREATMENT OF
ALLERGY

<130> 1151-4153US2

<150> 09/701,623

<151> 2000-12-01

<150> PCT/US99/13959

<151> 1999-06-21

<150> 09/100,287

<151> 1998-06-20

<160> 91

<170> PatentIn Ver. 2.1

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<213> HUMAN

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<301> Dorrington,
Bennich,

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<304> 41

<306> 3-25

<307> 1978

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Ser Cys Asp Gly Gly Gly His Phe Pro Pro Thr Ile Gln Leu Leu Cys
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Leu Val Ser Gly Tyr Thr Pro Gly Thr Ile Asn Ile Thr Trp Leu Glu
35 40 45

Asp Gly Gln Val Met Asp Val Asp Leu Ser Thr Ala Ser Thr Thr Gln
50 55 60

Glu Gly Glu Leu Ala Ser Thr Gln Ser Glu Leu Thr Leu Ser Gln Lys
65 70 75 80

His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr Gln Gly
85 90 95

His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn Pro Arg
100 105 110

Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu Phe Ile
 115 120 125
 Arg Lys Ser Pro Thr Ile Thr Cys Leu Val Val Asp Leu Ala Pro Ser
 130 135 140
 Lys Gly Thr Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Lys Pro Val
 145 150 155 160
 Asn His Ser Thr Arg Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr
 165 170 175
 Val Thr Ser Thr Leu Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu
 180 185 190
 Thr Tyr Gln Cys Arg Val Thr His Pro His Leu Pro Arg Ala Leu Met
 195 200 205
 Arg Ser Thr Thr Lys Thr Ser Gly Pro Arg Ala Ala Pro Glu Val Tyr
 210 215 220
 Ala Phe Ala Thr Pro Glu Trp Pro Gly Ser Arg Asp Lys Arg Thr Leu
 225 230 235 240
 Ala Cys Leu Ile Gln Asn Phe Met Pro Glu Asp Ile Ser Val Gln Trp
 245 250 255
 Leu His Asn Glu Val Gln Leu Pro Asp Ala Arg His Ser Thr Thr Gln
 260 265 270
 Pro Arg Lys Thr Lys Gly Ser Gly Phe Phe Val Phe Ser Arg Leu Glu
 275 280 285
 Val Thr Arg Ala Glu Trp Gln Glu Lys Asp Glu Phe Ile Cys Arg Ala
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 Val Asn Pro Gly Lys
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<213> Dog

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<301> Patel,

<303> Immunogenetics

<304> 41

<306> 282-286

<307> 1995

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Leu	Ile	Ser	Gly	Tyr	Val	Pro	Gly	Asp	Met	Glu	Val	Ile	Trp	Leu	Val	
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Asp	Gly	Gln	Lys	Ala	Thr	Asn	Ile	Phe	Pro	Tyr	Thr	Ala	Pro	Gly	Thr	
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Lys	Glu	Gly	Asn	Val	Thr	Ser	Thr	His	Ser	Glu	Leu	Asn	Ile	Thr	Gln	
	65				70					75					80	
Gly	Glu	Trp	Val	Ser	Gln	Lys	Thr	Tyr	Thr	Cys	Gln	Gly	Phe	Thr	Phe	
				85					90					95		
Lys	Asp	Glu	Ala	Arg	Lys	Cys	Ser	Glu	Ser	Asp	Pro	Arg	Gly	Val	Thr	
			100					105					110			
Ser	Tyr	Leu	Ser	Pro	Pro	Ser	Pro	Leu	Asp	Leu	Tyr	Val	His	Lys	Ala	
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Pro	Lys	Ile	Thr	Cys	Leu	Val	Val	Asp	Leu	Ala	Thr	Met	Glu	Gly	Met	
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Asn	Leu	Thr	Trp	Tyr	Arg	Glu	Ser	Lys	Glu	Pro	Val	Asn	Pro	Gly	Pro	
	145				150					155					160	
Leu	Asn	Lys	Lys	Asp	His	Phe	Asn	Gly	Thr	Ile	Thr	Val	Thr	Ser	Thr	
				165					170					175		
Leu	Pro	Val	Asn	Thr	Asn	Asp	Trp	Ile	Glu	Gly	Glu	Thr	Tyr	Tyr	Cys	
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Arg	Val	Thr	His	Pro	His	Leu	Pro	Lys	Asp	Ile	Val	Arg	Ser	Ile	Ala	
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Lys	Ala	Pro	Gly	Lys	Arg	Ala	Pro	Pro	Asp	Val	Tyr	Leu	Phe	Leu	Pro	
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Pro	Glu	Glu	Glu	Gln	Gly	Thr	Lys	Asp	Arg	Val	Thr	Leu	Thr	Cys	Leu	
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Ile	Gln	Asn	Phe	Phe	Pro	Ala	Asp	Ile	Ser	Val	Gln	Trp	Leu	Arg	Asn	
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Asp	Ser	Pro	Ile	Gln	Thr	Asp	Gln	Tyr	Thr	Thr	Thr	Gly	Pro	His	Lys	
			260					265					270			
Val	Ser	Gly	Ser	Arg	Pro	Ala	Phe	Phe	Ile	Phe	Ser	Arg	Leu	Glu	Val	
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Ser	Arg	Val	Asp	Trp	Glu	Gln	Lys	Asn	Lys	Phe	Thr	Cys	Gln	Val	Val	
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His	Glu	Ala	Leu	Ser	Gly	Ser	Arg									
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<307> 1978

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<304> 41
<306> 282-286
<307> 1995

<300>
<301> Steen,
<303> J. Mol. Biol.
<304> 177
<306> 19-32
<307> 1984

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<301> Ishida,
<303> EMBO J.
<304> 1
<306> 1117-1123
<307> 1982

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Ser Cys Asp Pro Asn Ala Phe His Ser Thr Ile Gln Leu Tyr Cys Phe
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Val Tyr Gly His Ile Gln Asn Asp Val Ser Ile His Trp Leu Met Asp
35 40 45
Asp Arg Lys Ile Tyr Asp Thr His Ala Gln Asn Val Leu Ile Lys Glu
50 55 60
Glu Gly Lys Leu Ala Ser Thr Tyr Ser Arg Leu Asn Ile Thr Gln Gln
65 70 75 80
Gln Trp Met Ser Glu Ser Thr Phe Thr Cys Lys Val Thr Ser Gln Gly
85 90 95
Glu Asn Tyr Trp Ala His Thr Arg Arg Cys Ser Asp Asp Glu Pro Arg
100 105 110
Gly Val Ile Thr Tyr Leu Ile Pro Pro Ser Pro Leu Asp Leu Tyr Glu
115 120 125
Asn Gly Thr Pro Lys Leu Thr Cys Leu Val Leu Asp Leu Glu Ser Glu

130	135	140
Glu Asn Ile Thr Val Thr Trp Val Arg Glu Arg Lys Lys Ser Ile Gly		
145	150	155
Ser Ala Ser Gln Arg Ser Thr Lys His His Asn Ala Thr Thr Ser Ile		
	165	170
Thr Ser Ile Leu Pro Val Asp Ala Lys Asp Trp Ile Glu Gly Glu Gly		
	180	185
Tyr Gln Cys Arg Val Asp His Pro His Phe Pro Lys Pro Ile Val Arg		
	195	200
Ser Ile Thr Lys Ala Leu Gly Leu Arg Ser Ala Pro Glu Val Tyr Val		
	210	215
Phe Leu Pro Pro Glu Glu Glu Glu Lys Asn Lys Arg Thr Leu Thr Cys		
225	230	235
Leu Ile Gln Asn Phe Phe Pro Glu Asp Ile Ser Val Gln Trp Leu Gln		
	245	250
Asp Ser Lys Leu Ile Pro Lys Ser Gln His Ser Thr Thr Thr Pro Leu		
	260	265
Lys Thr Asn Gly Ser Asn Gln Arg Phe Phe Ile Phe Ser Arg Leu Glu		
	275	280
Val Thr Lys Ala Leu Trp Thr Gln Thr Lys Gln Phe Thr Cys Arg Val		
	290	300
Ile His Glu Ala Leu Arg Glu Pro Arg		
305	310	

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His Arg Cys Asp Pro Asn Ala Phe His Ser Thr Ile Gln Leu Tyr Cys
20 25 30
Phe Ile Tyr Gly His Ile Leu Asn Asp Val Ser Val Ser Trp Leu Met
35 40 45
Asp Asp Arg Glu Ile Thr Asp Thr Leu Ala Gln Thr Val Leu Ile Lys
50 55 60
Glu Glu Gly Lys Leu Ala Ser Thr Cys Ser Lys Leu Asn Ile Thr Glu
65 70 75 80
Gln Gln Trp Met Ser Glu Ser Thr Phe Thr Cys Arg Val Thr Ser Gln

				85					90					95			
Gly	Cys	Asp	Tyr	Leu	Ala	His	Thr	Arg	Arg	Cys	Pro	Asp	His	Glu	Pro		
			100					105					110				
Arg	Gly	Ala	Ile	Thr	Tyr	Leu	Ile	Pro	Pro	Ser	Pro	Leu	Asp	Leu	Tyr		
		115					120					125					
Gln	Asn	Gly	Ala	Pro	Lys	Leu	Thr	Cys	Leu	Val	Val	Asp	Leu	Glu	Ser		
	130					135					140						
Glu	Lys	Asn	Val	Asn	Val	Thr	Trp	Asn	Gln	Glu	Lys	Lys	Thr	Ser	Val		
145					150					155					160		
Ser	Ala	Ser	Gln	Trp	Tyr	Thr	Lys	His	His	Asn	Asn	Ala	Thr	Thr	Ser		
			165					170						175			
Ile	Thr	Ser	Ile	Leu	Pro	Val	Val	Ala	Lys	Asp	Trp	Ile	Glu	Gly	Tyr		
			180					185					190				
Gly	Tyr	Gln	Cys	Ile	Val	Asp	Arg	Pro	Asp	Phe	Pro	Lys	Pro	Ile	Val		
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Arg	Ser	Ile	Thr	Lys	Thr	Pro	Gly	Gln	Arg	Ser	Ala	Pro	Glu	Val	Tyr		
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Val	Phe	Pro	Pro	Pro	Glu	Glu	Glu	Ser	Glu	Asp	Lys	Arg	Thr	Leu	Thr		
225					230					235					240		
Cys	Leu	Ile	Gln	Asn	Phe	Phe	Pro	Glu	Asp	Ile	Ser	Val	Gln	Trp	Leu		
			245						250					255			
Gly	Asp	Gly	Lys	Leu	Ile	Ser	Asn	Ser	Gln	His	Ser	Thr	Thr	Thr	Pro		
			260				265						270				
Leu	Lys	Ser	Asn	Gly	Asn	Gln	Gly	Phe	Phe	Ile	Phe	Ser	Arg	Leu	Glu		
		275					280					285					
Val	Ala	Lys	Thr	Leu	Trp	Thr	Gln	Arg	Lys	Gln	Phe	Thr	Cys	Gln	Val		
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Ile	His	Glu	Ala	Leu	Gln	Lys	Pro	Arg									
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synthesized from amino acids with no genetic
material as source

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Ala	Leu	Met	Arg	Ser	Thr	Thr	Lys	Cys
			20				25	

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Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro His Leu Pro Lys
1 5 10 15
Asp Ile Val Arg Ser Ile Ala Lys Cys
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synthesized from amino acids with no genetic
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Cys Gly Glu Gly Tyr Gln Ser Arg Val Asp His Pro His Phe Pro Lys
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Pro Ile Val Arg Ser Ile Thr Lys Cys
20 25

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Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp Arg Pro Asp Phe Pro Lys
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Pro Ile Val Arg Ser Ile Thr Leu Cys
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Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr
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Ile Asp

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1 5 10 15
Xaa Leu Phe

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Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu
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Thr Ala Lys Ser Lys Lys Phe Pro Ser Tyr Thr Ala Thr Tyr Gln Phe
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Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr
1 5 10 15
Ile Asp Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro

	20	25	30
His	Leu	Pro	Arg
	35	40	45
Ala	Leu	Met	Arg
Ser	Thr	Thr	Lys
			Cys

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 Thr Thr Ile Asp Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr
 35 40 45
 His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys
 50 55 60

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20 25 30

Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu
35 40 45

Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys
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20 25 30

Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys
35 40 45

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Gly Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu
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35 40 45

His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr Lys Cys

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 Phe Gly Gly Cys Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His
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Arg Ala Leu Met Arg Ser Thr Thr Lys Cys
      35             40

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Xaa	Gly	Gly	Cys	Gly	Glu	Thr	Tyr	Gln	Ser	Arg	Val	Thr	His	Pro	His
		35					40					45			
Leu	Pro	Arg	Ala	Leu	Met	Arg	Ser	Thr	Thr	Lys	Cys				
	50					55					60				

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<222> (29)

<223> I, M, V

<400> 23

Thr Ile Asn Lys Pro Lys Gly Tyr Val Gly Lys Glu Gly Gly Xaa Xaa
1 5 10 15

Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Xaa Glu Xaa Xaa Gly Gly Cys
20 25 30

Gly Glu Thr Tyr Gln Ser Arg Val Thr His Pro His Leu Pro Arg Ala
35 40 45

Leu Met Arg Ser Thr Thr Lys Cys
50 55

<210> 24

<211> 46

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<220>

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<222> (4)

<223> S, T

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<223> K, R

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<222> (12)

<223> H, T

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<221> MOD_RES

<222> (13)

<223> K, R

<220>

<221> MOD_RES

<222> (16)

<223> G, T

<400> 24

Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa
1 5 10 15

Ile Leu Phe Gly Gly Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp His
20 25 30

Pro Asp Phe Pro Lys Pro Ile Val Arg Ser Ile Thr Lys Cys
35 40 45

<210> 25

<211> 45

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 25

Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr
1 5 10 15

Ile Asp Gly Gly Cys Gly Tyr Gly Tyr Gln Ser Ile Val Asp His Pro
20 25 30

Asp Phe Pro Lys Pro Ile Val Arg Ser Ile Thr Lys Cys
35 40 45

<210> 26

<211> 45

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 26

Lys Lys Lys Ile Ile Thr Ile Thr Arg Ile Ile Thr Ile Ile Thr Thr
1 5 10 15

Ile Asp Gly Gly Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His Pro
20 25 30

His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys
35 40 45

<210> 27

<211> 46

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<220>

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<222> (1)
<223> I, M, L

<220>
<221> MOD_RES
<222> (2)
<223> S, T

<220>
<221> MOD_RES
<222> (7)
<223> K, L

<220>
<221> MOD_RES
<222> (8)
<223> G, R

<220>
<221> MOD_RES
<222> (9)
<223> V, T

<220>
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<222> (10)
<223> I, V

<220>
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<222> (14)
<223> I, T

<220>
<221> MOD_RES
<222> (15)
<223> E, R

<220>
<221> MOD_RES
<222> (16)
<223> G, M

<220>
<221> MOD_RES
<222> (19)
<223> F, T

<220>
<221> MOD_RES
<222> (20)
<223> G, M

<400> 27
Xaa Xaa Ile Ser Glu Ile Xaa Gly Val Xaa Val His Lys Xaa Xaa Xaa
1 5 10 15

Ile Leu Xaa Xaa Gly Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr His
20 25 30

Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys

35

40

45

<210> 28

<211> 49

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 28

Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro
1 5 10 15

Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu
20 25 30

Val Val Asp Leu Ala Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser
35 40 45

Arg

<210> 29

<211> 60

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 29

Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
1 5 10 15

Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu
20 25 30

Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp Leu Ala
35 40 45

Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg
50 55 60

<210> 30

<211> 64

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 30
 Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys
 1 5 10 15
 Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser
 20 25 30
 Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val
 35 40 45
 Val Asp Leu Ala Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg
 50 55 60

<210> 31
 <211> 76
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 31
 Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr
 1 5 10 15
 Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
 20 25 30
 Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu
 35 40 45
 Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp Leu Ala
 50 55 60
 Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg
 65 70 75

<210> 32
 <211> 35
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 32
 Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro
 1 5 10 15
 Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu
 20 25 30

Val Val Asp
35

<210> 33
<211> 46
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 33
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
1 5 10 15
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu
20 25 30
Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp
35 40 45

<210> 34
<211> 50
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 34
Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys
1 5 10 15
Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser
20 25 30
Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val
35 40 45

Val Asp
50

<210> 35
<211> 62
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 35
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr

1	5	10	15
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn	20	25	30
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu	35	40	45
Phe Ile Arg Lys Ser Pro Thr Ile Thr Ser Leu Val Val Asp	50	55	60

<210> 36
 <211> 29
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 36
Cys Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro
1 5 10 15
Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile
20 25

<210> 37
 <211> 40
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 37
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
1 5 10 15
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu
20 25 30
Phe Ile Arg Lys Ser Pro Thr Ile
35 40

<210> 38
 <211> 44
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 38
 Gln Val Thr Tyr Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys
 1 5 10 15
 Ala Asp Ser Asn Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser
 20 25 30
 Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Ile
 35 40

<210> 39
 <211> 56
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 39
 Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Ser Gln Val Thr Tyr
 1 5 10 15
 Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
 20 25 30
 Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu
 35 40 45
 Phe Ile Arg Lys Ser Pro Thr Ile
 50 55

<210> 40
 <211> 76
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<400> 40
 Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr
 1 5 10 15
 Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
 20 25 30
 Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro Phe Asp Leu
 35 40 45
 Phe Ile Arg Lys Ser Pro Thr Ile Thr Cys Leu Val Val Asp Leu Ala
 50 55 60
 Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg
 65 70 75

<210> 41
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 41
Cys Lys Gln Arg Asn Gly Thr Leu Thr Cys
1 5 10

<210> 42
<211> 45
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 42
Gln Lys His Trp Leu Ser Asp Arg Thr Tyr Thr Cys Gln Val Thr Tyr
1 5 10 15
Gln Gly His Thr Phe Glu Asp Ser Thr Lys Lys Cys Ala Asp Ser Asn
20 25 30
Pro Arg Gly Val Ser Ala Tyr Leu Ser Arg Pro Ser Pro
35 40 45

<210> 43
<211> 34
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 43
Cys Pro Ser Lys Gly Thr Val Asn Leu Thr Trp Ser Arg Ala Ser Gly
1 5 10 15
Lys Pro Val Asn His Ser Thr Arg Lys Glu Glu Lys Gln Arg Asn Gly
20 25 30
Thr Cys

<210> 44
<211> 33
<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 44

Cys Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr Tyr Gln Cys
1 5 10 15

Arg Val Thr His Pro His Leu Pro Arg Ala Leu Met Arg Ser Thr Thr
20 25 30

Cys

<210> 45

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 45

Ser Thr Thr Lys Thr Ser Gly Pro Arg Ala Ala Pro Glu Val
1 5 10

<210> 46

<211> 14

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 46

Cys Trp Ser Arg Ala Ser Gly Lys Pro Val Cys Asn His Ser
1 5 10

<210> 47

<211> 19

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 47

Cys Ser Arg Pro Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr
1 5 10 15

Ile Thr Cys

<210> 48
<211> 13
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 48
Cys Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Pro Cys
1 5 10

<210> 49
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 49
Cys Pro Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Pro Cys
1 5 10 15

<210> 50
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 50
Cys Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr Val Thr Ser Cys
1 5 10 15

<210> 51
<211> 8
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 51

Lys Glu Glu Lys Gln Arg Asn Gly
1 5

<210> 52
<211> 11
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 52
Cys Trp Ser Arg Ala Ser Gly Lys Pro Val Cys
1 5 10

<210> 53
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 53
Pro Thr Ile Thr Cys Leu Val Leu Asp Leu Ala Pro Ser Lys Gly Thr
1 5 10 15

Val Asn Leu Thr Cys
20

<210> 54
<211> 16
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 54
Pro Thr Ile Thr Cys Leu Val Leu Asp Leu Ala Pro Ser Lys Gly Thr
1 5 10 15

<210> 55
<211> 25
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 55

Thr Ser Thr Leu Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr
1 5 10 15

Tyr Gln Cys Arg Val Thr His Pro His
20 25

<210> 56

<211> 16

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 56

Pro Thr Ile Thr Ser Leu Val Leu Cys Leu Ala Pro Ser Lys Gly Cys
1 5 10 15

<210> 57

<211> 23

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 57

Cys Val Asn Leu Thr Trp Ser Arg Ala Ser Gly Lys Pro Val Asn His
1 5 10 15

Ser Thr Arg Lys Glu Glu Cys
20

<210> 58

<211> 53

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 58

Cys Thr Trp Ser Arg Ala Ser Gly Lys Pro Val Asn His Ser Thr Arg
1 5 10 15

Lys Glu Glu Lys Gln Arg Asn Gly Thr Leu Thr Val Thr Ser Thr Leu
20 25 30

Pro Val Gly Thr Arg Asp Trp Ile Glu Gly Glu Thr Tyr Gln Cys Arg
35 40 45

Val Thr His Pro His
50

<210> 59
<211> 10
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 59
Lys Thr Lys Gly Ser Gly Phe Phe Val Phe
1 5 10

<210> 60
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
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synthesized from amino acids with no genetic
material as source

<220>
<221> MOD_RES
<222> (4)
<223> S, T

<220>
<221> MOD_RES
<222> (7)
<223> K, R

<220>
<221> MOD_RES
<222> (8)
<223> G, T

<220>
<221> MOD_RES
<222> (12)
<223> H, T

<220>
<221> MOD_RES
<222> (13)
<223> K, R

<220>
<221> MOD_RES
<222> (16)
<223> G, T

<400> 60

Ile Ser Ile Xaa Glu Ile Xaa Xaa Val Ile Val Xaa Xaa Ile Glu Xaa
1 5 10 15

Ile Leu Phe

<210> 61
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 61
Leu Ser Glu Ile Lys Gly Val Ile Val His Arg Leu Glu Gly Val
1 5 10 15

<210> 62
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 62
Gly Ile Leu Glu Ser Arg Gly Ile Lys Ala Arg Ile Thr His Val Asp
1 5 10 15

Thr Glu Ser Tyr
20

<210> 63
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 63
Lys Lys Gln Tyr Ile Lys Ala Asn Ser Lys Phe Ile Gly Ile Thr Glu
1 5 10 15

Leu

<210> 64
<211> 22
<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 64

Lys Lys Phe Asn Asn Phe Thr Val Ser Phe Trp Leu Arg Val Pro Lys
1 5 10 15

Val Ser Ala Ser His Leu
20

<210> 65

<211> 30

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 65

Lys Lys Leu Arg Arg Leu Leu Tyr Met Ile Tyr Met Ser Gly Leu Ala
1 5 10 15

Val Arg Val His Val Ser Lys Glu Glu Gln Tyr Tyr Asp Tyr
20 25 30

<210> 66

<211> 27

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 66

Tyr Asp Pro Asn Tyr Leu Arg Thr Asp Ser Asp Lys Asp Arg Phe Leu
1 5 10 15

Gln Thr Met Val Lys Leu Phe Asn Arg Ile Lys
20 25

<210> 67

<211> 24

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 67
Gly Ala Tyr Ala Arg Cys Pro Asn Gly Thr Arg Ala Leu Thr Val Ala
1 5 10 15

Glu Leu Arg Gly Asn Ala Glu Leu
20

<210> 68
<211> 15
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 68
Phe Phe Leu Leu Thr Arg Ile Leu Thr Ile Pro Gln Ser Leu Asp
1 5 10 15

<210> 69
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 69
Val Ser Phe Gly Val Trp Ile Arg Thr Pro Pro Ala Tyr Arg Pro Pro
1 5 10 15

Asn Ala Pro Ile Leu
20

<210> 70
<211> 20
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 70
Ser Asp Phe Phe Pro Ser Val Arg Asp Leu Leu Asp Thr Ala Ser Ala
1 5 10 15

Leu Tyr Arg Glu
20

<210> 71
<211> 20

<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 71
Pro His His Thr Ala Leu Arg Gln Ala Ile Leu Cys Trp Gly Glu Leu
1 5 10 15
Met Thr Leu Ala
20

<210> 72
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 72
Trp Val Arg Asp Ile Ile Asp Asp Phe Thr Asn Glu Ser Ser Gln Lys
1 5 10 15
Thr

<210> 73
<211> 19
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 73
Arg Ala Gly Arg Ala Ile Leu His Ile Pro Thr Arg Ile Arg Gln Gly
1 5 10 15
Leu Glu Arg

<210> 74
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 74

Ala Val Ala Glu Gly Thr Asp Arg Val Ile Glu Val Leu Gln Arg Ala
1 5 10 15

Gly Arg Ala Ile Leu
20

<210> 75

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 75

Ala Leu Asn Ile Trp Asp Arg Phe Asp Val Phe Ser Thr Leu Gly Ala
1 5 10 15

Thr Ser Gly Tyr Leu Lys Gly Asn Ser
20 25

<210> 76

<211> 22

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 76

Asp Ser Glu Thr Ala Asp Asn Leu Glu Lys Thr Val Ala Ala Leu Ser
1 5 10 15

Ile Leu Pro Gly His Gly
20

<210> 77

<211> 39

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 77

Glu Glu Ile Val Ala Gln Ser Ile Ala Leu Ser Ser Leu Met Val Ala
1 5 10 15

Gln Ala Ile Pro Leu Val Gly Glu Leu Val Asp Ile Gly Phe Ala Ala
20 25 30

Thr Asn Phe Val Glu Ser Cys
35

<210> 78
<211> 21
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 78
Asp Ile Glu Lys Lys Ile Ala Lys Met Glu Lys Ala Ser Ser Val Phe
1 5 10 15

Asn Val Val Asn Ser
20

<210> 79
<211> 17
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 79
Lys Trp Phe Lys Thr Asn Ala Pro Asn Gly Val Asp Glu Lys Ile Arg
1 5 10 15

Ile

<210> 80
<211> 14
<212> PRT
<213> Artificial Sequence

<220>
<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 80
Gly Leu Gln Gly Lys Ile Ala Asp Ala Val Lys Ala Lys Gly
1 5 10

<210> 81
<211> 19
<212> PRT
<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 81

Gly Leu Ala Ala Gly Leu Val Gly Met Ala Ala Asp Ala Met Val Glu
1 5 10 15

Asp Val Asn

<210> 82

<211> 20

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 82

Ser Thr Glu Thr Gly Asn Gln His His Tyr Gln Thr Arg Val Val Ser
1 5 10 15

Asn Ala Asn Lys
20

<210> 83

<211> 15

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 83

Cys Pro Ser Pro Phe Asp Leu Phe Ile Arg Lys Ser Pro Thr Cys
1 5 10 15

<210> 84

<211> 25

<212> PRT

<213> Artificial Sequence

<220>

<223> Description of Artificial Sequence: Peptide
synthesized from amino acids with no genetic
material as source

<400> 84

Cys Gly Glu Thr Tyr Lys Ser Thr Val Ser His Pro Asp Leu Pro Arg
1 5 10 15

Glu Val Val Arg Ser Ile Ala Lys Cys

<210> 85
 <211> 60
 <212> PRT
 <213> Artificial Sequence

<220>
 <223> Description of Artificial Sequence: Peptide
 synthesized from amino acids with no genetic
 material as source

<220>
 <221> MOD_RES
 <222> (18)
 <223> S, T

<220>
 <221> MOD_RES
 <222> (21)
 <223> K, R

<220>
 <221> MOD_RES
 <222> (22)
 <223> G, T

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 Phe Gly Gly Cys Gly Gly Thr Tyr Gln Ser Arg Val Thr His Pro His
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synthesized from amino acids with no genetic
material as source

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1 5 10 15

Ile Lys Ile Ser Leu Thr Glu Ile Arg Thr Val Ile Val Thr Arg Leu
20 25 30

Glu Thr Val Leu Phe Lys Cys Gly Glu Thr Tyr Tyr Ser Arg Val Thr
35 40 45

His Pro His Leu Pro Lys Asp Ile Val Arg Ser Ile Ala Lys Cys

50

55

60